Problem Based Learning in Neurophysiology through the Webct Platform 6.2 Ucm Virtual Campus


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Abstract

Our project for the problem based learning (PBL) of Neurophysiology through the WebCT platform 6.2 Complutense University of Madrid (UCM) Virtual Campus is based on the essential role of the Information and Communication Technologies (ICT) as new methods of teaching physiology within the European Higher Education Area (EHEA). PBL of Neurophysiology has been carried out by a group of twelve teachers in Physiology, with extensive teaching experience from the Faculty of Pharmacy at the UCM in “Morphology, Histology and Cell Physiology” and “Physiology”, subjects included in the first cycle of the Bachelor of Pharmacy. Use of the PBL as a support to-face instruction (theory and practice) has significantly improved the acquisition of knowledge concerning the mechanisms of regulation and integration features of Neurophysiology. The students had presentations on the Web with a detailed summary of the fundamental conceptual basis of each item, as well as self-assessment tests of increasing complexity, correctness and a filter that automatically prevented the passage to a higher level of complexity without having acquired the minimum knowledge set in earlier. This together with the consultation of questions through e-mail, provided to a large extent, the understanding of the contents covered. Of note is the excellent reception by students and the implementation of these problem cases in the Virtual Campus. In summary, the teaching work performed, overall, favoured a more active, autonomous, sustainable, cooperative and critical attitude of students in their learning process.

1. Introduction

Problem-based learning (PBL) is teaching work resulting from the process toward understanding and solving a problem or case-scenario in a self-directed and independent teaching methodology that uses cooperative learning tools such as discussion groups where students assume different roles (moderator, reporter or member) under the supervision of a tutor, whose role is to encourage the active participation of students and ensure the achievement of learning objectives. The use of PBL as a method of instruction in physiology, was originally developed by the Faculties of Medicine of the University of Delaware and Jefferson Medical College, United States, whose results were compiled in an article published in Advances in Physiology Education [1], which demonstrates the suitability of this learning method to promote the development of critical thinking and communication skills of the students involved. In the course of PBL in physiology, students work cooperatively to solve complex real problems. Students learn to ask critical questions to identify what they need to know to answer those questions and where to find the answers to those questions. The tutor facilitates the process of solving the problem, acting as a coach. PBL is recognized as a teaching methodology, in which the student is the main character, where it promotes the integration of a more profound and lasting as students are encouraged to take an active role in their training by discussing a case-problem focused on a clinical situation, a problem or on a debate of the current scientific community. The main advantages of this teaching methodology is its ability to motivate students in active learning and deep their knowledge as they develop a set of generic skills such as teamwork, responsibility for their own learning or communication skills that will be essential in developing their career [2]. The use of PBL is particularly indicated in the teaching of physiology as this area is the conceptual underpinning of disciplines such as
pharmacology and clinical pathophysiology, which are part of the curriculum of the biomedical careers [3]. Thus, PBL allows the integration of basic and clinical skills enabling a deep and lasting learning.

2. Objectives

PBL is an excellent instruction as a tool of the approach in different scenarios which requires the search for information in books and databases and enhances communication skills and encourages public advocacy and hence, an enduring self and cooperative and scientific development of critical thinking. In line with these principles, we were encouraged to continue deepening the search for new teaching strategies through the possibilities offered by the Virtual Campus of the UCM. Virtually all of the teaching staff (12 members) of the Department of Physiology, Faculty of Pharmacy, have proposed as a general purpose in this project, the implementation of PBL in the teaching of Neurophysiology. A subject that forms part of "Morphology, Histology and Cell Physiology" and "Physiology" core subjects of the Pharmacy Degree. Our aim is to promote the sustainable and cooperative self promoting critical thinking skills and communication skills and team building. Specifically, the objectives of this project are:

- The preparation of cases, problems or scenarios and tutor guides on key aspects of Neurophysiology.
- The implementation of PBL in the teaching of the Physiology.
- The evaluation of teaching methods used and the staff of the Department involved.

3. Methodology

The project work plan is structured in four distinct stages informing on:

1. Course introduction and definition of learning objectives. The PBL course will be presented in the inaugural class of the subjects involved in the month of September. It shall indicate the advisability of taking this course in its entirety, on a voluntary basis, the advantages of this didactic method and that participation will have the same positive impact on final grades for each subject. The overall project objectives are:

- The integration of basic and clinical knowledge.
- The scientific development of critical thinking.
- Improvement of communication skills and public advocacy.
- Autonomous learning, sustainable and cooperative.

2. Development-problem cases and tutor guides. This stage will take place during the months of October and November 2010 and February 2011 and the case will consist of problems or scenarios of Neurophysiology of greatest importance in order to integrate essential conceptual basis of clinical practice. In order to maintain student interest it uses three scenarios promoting the identification of learning objectives and provides a tutorial guide indicating the specific learning objectives

3. PBL course development in the teaching of students of "Morphology, Histology and Cell Physiology" and "Physiology." In this course, students will be divided into three groups of 10-15 people that should be maintained throughout the duration. To maintain the interest of various groups of students involved various types of problems will be used (clinical cases and real-life scenarios). Students will have the description of cases through the Virtual Campus group working in a structured manner, so initially, an issue raised by the guardian will be reviewed by the student group, and they should select a moderator and a rapporteur who writing reflected the ideas generated by the group. The guardian shall ensure that the group address the problem in a methodical encouraging interaction and questions from members of the group.

4. Evaluation of the results. The assessment methodology will be conducted at the end of the course through surveys on the suitability of each of the proposed scenarios and mentors involved and the attitudes generated by the implementation of PBL in the teaching of Neurophysiology. The results of these surveys will be analized and discussed with students.

4. Results

All the proposed objectives have been raised. Thus:
Objective 1. Three scenarios have been developed or case problem for the Neurophysiology learning by the PBL methodology, related to essential aspects (action potential in nerve, cardiac action
potential and sensory nervous system) of the subjects: "Morphology, Histology and Cell Physiology" and "Physiology" of the Pharmacy Degree.

Objective 2. Methodology has been implemented for PBL Neurophysiology learning during the 2010-2011 academic year. This experience has been conducted in four groups of students as part of practical activities of the subject and has taken place over the two semesters of the course.

Objective 3. Activities has been evaluated both informally through discussions between students and tutors, as by a specific survey at the end of the course.

In developing the project 28 students involved enrolled on the subject "Morphology, Histology and Cellular Physiology" and 30 students from "Physiology" of the Pharmacy Degree and the total (12) research team members, belonging to the Department of Physiology of the Faculty of Pharmacy, Complutense University of Madrid. Also, to take into account is the collaboration of the staff Services Administration, Faculty of Pharmacy, who provided classrooms and computer equipment necessary for project development. For this project, the Virtual Campus Complutense University has been essential. In the area of physical resources, there was a need for smaller classrooms and projection systems assisted by computer, which have been provided from the Associate Dean of Teaching Programming.

The scenarios were referred in a context that facilitates identification of students with different situations. At the end of each scenario there is an emphasis on a series of learning objectives and sources of selected information are provided. For each case-problem discussion sessions were held for 2 hours. Each of the parties of the case-problem and contact details (phone and e-mail) of the tutors were placed in a specific repository in the Virtual Campus of the subjects "Morphology, Histology and Cellular Physiology" and "Physiology" one week prior to the meeting for discussion. The day before the holding of the meeting, students, individually or in groups of 2 persons maximum were sent e-mails to by their tutors reporting and reasoning about the different learning objectives and that would provide a basis for discussion.

PBL activity involved four groups of students (12-15 students in each group) who worked under the supervision of individual tutors who acted as moderators of the sessions discussion and took care to qualifying, as well as reports student participation in discussion sessions. In each session, the students chose a rapporteur and a secretary who was responsible for driving the discussion and record the progress of it, including the formulation of new goals learning.

4.1. Evaluation of student participation and survey results on the curriculum in PBL.

It must be stressed that students with a high academic performance, all of which referred to 100% of reports requested and attended a percentage above 90% for all discussion sessions. Similarly, 100% of students completed the survey on the curriculum module PBL. It should be noted that significant differences in the results of the four student groups were not obtained. The students did not know the PBL methodology, which determines that in its assessment of the activity have not been influenced by preconceptions. The overall assessment of the activity was highly positive (8.2 points of 10) despite the high commitment (an average of 34 hours, 22 hours of personal work and 12 hours spent on discussion sessions) involving. This assessment refers to the usefulness of this learning activity for Physiology and was similar to that obtained theoretical classes and the Virtual Campus, and higher than the labs. The intervention of the tutors were qualified enough for the 80% students compared to 15% of those who considered excessive. The tutorial work scores well (4.6 of 5), indicating that the work of the tutors was adequate and sufficient. The results of the questionnaire about the ability of the PBL methodology for encourages and facilitates learning of Physiology independently is scored with 4.3 of 5. These results are consistent with rated aspects of the activity (association of concepts theory with professional practice, higher level of understanding and group work) and to the conclusion that objectives have been achieved.

4.2. Future impact of PBL in the teaching activity of Physiology.

The development of this project will allow the consolidation of PBL methodology of teaching in Physiology year 2011-2012. It is our intention to gradually increase the number of problem-cases that can be programmed regularly during term time. Also, to expand the number of groups in which this methodology applies if, hopefully there will be a continuing demand for this activity among students.
5. Conclusions

Students have completed the PBL courses "Morphology, Histology and Cellular Physiology" and "Physiology" of the Pharmacy Degree by using the WebCT platform of the UCM.

From all the activities we can conclude:
1. The excellent reception by students of the implementation of these problem cases in the Virtual Campus.
2. The teaching work performed, overall, favoured a more active, autonomous, sustainable, cooperative and critical attitude of students in their learning process.

6. References


7. Acknowledgements

This work was supported by grant no. 154 (Educational Projects of Innovation and Improvement of the Teaching, 2010) from the Universidad Complutense de Madrid, Spain. The authors wish to thank to Mrs. Ana Maigler for English language revision.